

CLAIMS

1. A heat storage tank comprising a tank body for storing liquid while maintaining the warmth thereof and a housing having a fluid passage communicated with the interior of the tank body and allowing the liquid to pass therethrough,

said tank body having an inner tank and an outer tank; said inner and outer tanks being welded together at a tank body port to define a sealed space between said inner tank and said outer tank; said sealed space being substantially a vacuum; and

part of said housing being inserted and fitted into said tank body port, wherein

a welded portion between said inner tank and said outer tank is not encircled with said housing but opens outward in the radial direction of the said tank body port, and

a gap extended in the axial direction of said tank body port is defined between the welded portion of said inner tank with said outer tank and a welded portion-opposed part of said housing opposed to said welded portion in the axial direction of said tank body port; said gap having a size incapable of substantially retaining water drops.

2. A heat storage tank as defined by claim 1, further comprising

a flow-straightening member having a pipe-inserting hole provided in the interior of said tank body to be integral with said tank body,

a pipe inserted into said pipe-inserting hole of said flow-straightening member and connected to the fluid passage in said housing, and

a flange provided in said pipe to be opposed to the periphery of said pipe-inserting hole in said flow-straightening member in the inserting direction of the pipe; wherein

a sealing elastic member provided between

the periphery of said pipe-inserting hole in said flow-straightening member and said flange.

3. A heat storage tank as defined by claim 2, wherein said tank is adapted so that, when said welded  
5 portion-opposed part of said housing moves away from said welded portion of said tank body to enlarge said gap, a position of said flange provided in said pipe is shifted relative to said flow-straightening member to increase an amount of liquid flowing through an annular gap between  
10 the inner edge of said pipe-inserting hole in said flow-straightening member and the outer circumference of said pipe, whereby the liquid flows through said annular gap and the fluid in said tank flows from the upper end of said pipe to be out of the tank through a passage within  
15 the pipe.

4. A heat storage tank as defined by claim 3, wherein said elastic member is a sealing member for restricting an amount of liquid flowing through said  
annular gap between the inner edge of said pipe-inserting  
20 hole in said flow-straightening member and the outer circumference of said pipe.

5. A heat storage tank as defined by claim 4, wherein said tank body port is mounted in the interior of a vehicle while facing to the ground.

25 6. A heat storage tank as defined by claim 5, wherein said heat tank is used in a cooling device for an engine, and wherein warmed coolant flows into said inner tank via said fluid passage provided in said housing and stored therein while being warmed and flows out of said  
30 inner tank when said engine is preheated.

7. A heat storage tank as defined by claim 6, wherein said flow-straightening member provided in the interior of said tank body includes a mixing-preventing plate for uniformly straightening cold coolant flowing  
35 into the tank when said engine is preheated, and causes it to flow upward from said flow-straightening member so that warm coolant above the flow-straightening member

gradually rises while the mixing thereof with cold coolant is suppressed,

5                   said flow-straightening member being provided with one pipe-inserting hole and a number of apertures for uniformly straightening coolant.

8.     A heat storage tank as defined by claim 7, wherein part of said housing is inserted into said tank body port and fitted to its inner circumference, and an O-ring for preventing the liquid leakage is provided  
10    between said tank body port and said housing.

9.     A heat storage tank as defined by claim 8, wherein one end of said pipe is connected to said fluid passage of said housing and the other end of said pipe opens to a space in said inner tank filled with coolant;  
15    the coolant in said inner tank flowing out of the tank through said pipe and said fluid passage, said pipe extending through said pipe-inserting hole in said flow-straightening member, and wherein said flange is provided midway of said pipe and extends outward in the radial  
20    direction; said flange being fixed to be integral with said pipe as part of said pipe.

10.    A heat storage tank as defined by claim 9, wherein said flange is opposed to the periphery of said pipe-inserting hole in said flow-straightening member in  
25    the inserting direction of the pipe, and said flange and the inner circumference of said pipe-inserting hole in said flow-straightening member are not fixed to each other so that said inner tank is slightly shifted relative to said flange in the extending direction of the  
30    pipe when the weight or pressure of the coolant is applied to said inner tank.

11.    A heat storage tank as defined by claim 10, wherein

35                   said heat storage tank is attached to an vehicle body member by a heat storage tank-mounting member having brackets attached to a band; said band having one cut thereon so that said heat storage tank is

mounted to said vehicle body member by fastening opposite ends of said band in the circumferential direction of said tank body to said tank body with bolt;

5                   said housing is retained by said tank body via a housing supporting member attached to said heat storage tank-mounting member so that a size of said gap formed between the welded portion of said inner tank with said outer tank and the welded portion-opposed part of said housing is determined, and

10                   a size of said annular gap between said flange and the inner edge of said pipe-inserting hole in said flow-straightening member is determined and, in accordance with the size of said annular gap, said elastic member is compressed and elastically deformed in  
15                   the thickness direction of said elastic member.